Name: Date: Period:

**The Surface Area to Volume Ratio of a Cell**

Cells are limited in how large they can be. This is because the surface area and volume ratio does not stay the same as their size increases. Because of this, it is harder for a large cell to pass materials in and out of the membrane, and to move materials through the cell.

Cell Dimensions Surface area Volume Ratio:

(l x w x 6 sides) (l x w x h) Surface area to Vol.

(cm^2) (cm^3) (SA/Vol)

1 1 x 1 x 1

2 2 x 2 x 2

3 4 x 4 x 4

4 8 x 8 x 8

Data Table: Cell Size Comparison

These ratios show how many times larger the surface area is compared to the volume. Notice that it becomes less than one very quickly.

Questions:

1. Which number model has the largest surface area? \_\_\_\_\_\_\_\_\_\_\_\_
2. Which number model has the largest volume? \_\_\_\_\_\_\_\_\_\_\_\_\_\_
3. Which number model has the largest ratio of surface area to volume? \_\_\_\_\_\_\_\_\_
4. Why is it important for cells to be small, but have a large surface area?

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**The Surface Area to Volume Ratio of a Cell KEY**

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Cell Dimensions Surface area Volume Ratio:

(l x w x 6 sides) (l x w x h) Surface area to Vol.

(cm^2) (cm^3) (SA/Vol)

1 1 x 1 x 1 1 x 1 x 6 1 x 1 x 1 6 cm^2/1 cm^3

6 cm^2 1 cm^3 6/cm

2 2 x 2 x 2 2 x 2 x 6 2 x 2 x 2 24 cm^2/8 cm^3

24 cm^2 8 cm^3 3/cm

3 4 x 4 x 4 4 x 4 x 6 4 x 4 x 4 96 cm^2/64 ^3

96 cm^2 64 cm^3 1.5/cm

4 8 x 8 x 8 8 x 8 x 6 8 x 8 x 8 384 cm^2/512 cm^3 384 cm^2 512 cm^3 .75/cm

Data Table: Cell Size Comparison

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Questions:

1. Which number model has the largest surface area? \_\_\_\_\_\_**4**\_\_\_\_\_\_
2. Which number model has the largest volume? \_\_\_\_\_\_**4**\_\_\_\_\_\_\_\_
3. Which number model has the largest ratio of surface area to volume? \_\_\_\_**1**\_\_\_
4. Why is it important for cells to be small, but have a large surface area?

**To absorb material and get rid of wastes through the cell membrane**